Claims

What is claimed is:

1. A gas analysis device for remotely determining at least one characteristic of a vehicle emission plume comprising:

a radiation source;

a plurality of moveable filters sequentially positionable to receive radiation from said radiation source after the radiation has passed through a vehicle emission plume, each of said filters being capable of filtering out radiation except for a predetermined wavelength band; and

a detector positioned such that radiation from said radiation source may be sequentially directed onto said detector via at least two filters to thereby produce a plurality of detector responses proportional to the intensity of radiation directed onto the detector via said at least two filters.

2. The device according to claim 1, wherein said plurality of filters are arranged on a moveable filter wheel.

3. The device according to claim 2, wherein the filter wheel and the detector are housed in a housing which is sealed to substantially prevent radiation from reaching the detector except via one of said filters.

4. The device according to claim 1, further comprising a general filter which removes substantially all visible light from a radiation beam passed through said general filter, said general filter being positioned such that a beam from said radiation source must pass through said general filter after passing through a vehicle emission plume and before reaching said detector.

5. The device according to claim 1, wherein said plurality of filters comprise at least one reflective filter.

6. The device according to claim 1, wherein said plurality of filters comprise at least one pass through filter.

7. The device according to claim 1, wherein said radiation source projects a beam of infrared radiation across the path of a moving vehicle.

8. The device according to claim 1 further comprising a processor for processing at least one detector response to provide information about the composition of an exhaust plume of a moving vehicle.

9. The device according to claim 8 further comprising an indicator for informing the processor which filter is optically aligned with the detector for a particular detector response.

10. A method for remotely determining at least one characteristic of a vehicle emission plume comprising the steps of:

a) providing a source of radiation and a plurality of filters each of which is capable of filtering out radiation except for radiation in a predetermined wavelength band;

b) directing radiation from the source through an emission plume of a moving vehicle to a first filter and then to a detector;

c) generating a first detector response indicative of the intensity of radiation received by the detector;

d) positioning a further filter such that the radiation from the source is directed through the exhaust plume of the moving vehicle to the further filter and then to the detector;

e) generating a further detector response indicative of the intensity of light received by the detector via the filter positioned in step d);

f) optionally repeating a sequence of steps d) - e) to obtain an additional detector response for each repetition of the sequence; and

g) determining at least one characteristic of the vehicle emission plume from said detector responses.

11. The method according to claim 10, wherein the plurality of filters are arranged on a filter wheel, and the step of moving the plurality of filters comprises rotating the filter wheel.

12. The method according to claim 10, further comprising the step of passing the radiation from the emission plume through a general filter to remove substantially all light having a wavelength outside a predetermined broad detection band prior to directing said radiation to the plurality of filters.

13. The method according to claim 10, wherein the plurality of filters and the detector are located within a housing which is sealed to substantially prevent radiation from reaching the detector except via one of said filters.

14. The method according to claim 10, wherein the source of radiation directs the radiation through the emission plume.

15. The method according to claim 14, wherein the source of radiation directs a beam of infrared radiation across the path of a moving vehicle.

16. The method according to claim 10, wherein the filters comprise at least one pass through filter.

17. The method according to claim 10, wherein the filters comprise at least one reflective filter.

18. A method for remotely determining at least one characteristic of a vehicle emission plume comprising the steps of:

a) providing a source of radiation and a plurality of filters each of which is capable of filtering out radiation except for radiation in a predetermined wavelength band;

b) directing radiation from the source through an emission plume of a moving vehicle to a first filter and then to a detector;

c) generating a first detector response indicative of the intensity of radiation received by the detector;

d) positioning the detector such that the radiation from the source may be directed through the exhaust plume to a further filter and then to the detector;

e) directing the radiation from the source to the filter positioned in step d) and then to the detector;

f) generating a second detector response indicative of the intensity of light received by the detector via the further filter;

g) optionally repeating a sequence of steps d) - f) to obtain an additional detector response for each repetition of the sequence; and

h) determining at least one characteristic of the vehicle emission plume from said detector responses.

19. The method according to claim 18, wherein the filters comprise at least one pass through filter.

20. The method according to claim 18, wherein the filters comprise at least one reflective filter.